

Numbers and Nerves: Seeking a Discourse of Environmental Sensitivity in a World of Data

Scott Slovic

ABSTRACT

The human brain is still rather primitive inasmuch as it tends to be much more deeply impressed by concrete perceptions (seeing a man pointing a gun) than by abstract concepts (global warming) that can only be expressed in the mathematical terms of the physical or social sciences. Ecologists then face the problem of making clear to people the immediacy and seriousness of the threat of the numerous ecological dangers we face, dangers for which the physical evidence becomes clearer every day, just as their mathematical probability becomes ever more precisely calculated. Literary texts with a value finally more social than aesthetic are now one of the best means of making us feel concretely and individually the meaning and potential impact of these "abstractions": That is, these texts can "refine the ecological discourse" by making that which once seemed physically and mathematically abstract become experientially particular and concrete.

KEY WORDS

ecological discourse
refinement
social value of texts
aesthetic value of texts
environmental sensitivity

abstraction
concrete experience
human evolution
ecological danger



In my culture, we live today in a condition of inundation. We are up to our necks in fragments of information, in facts and figures and the prognostications of experts—we are drowning in data, and we don't know what to do. I am speaking in particular about my own country, the United States, and about such countries as Germany and Japan that I know especially well; but I suspect my comments will be relevant to the experience of people living in most industrialized, technology-oriented societies.

What is the relationship between information and meaning, and between the meaning of random pieces of information and integrated worldviews, and between such worldviews and daily behavior? What can so-called experts tell us about the world that will impress us and offer acceptable guidance and perhaps enable or inspire us to change our lives and work toward keeping the planet inhabitable for our species? And perhaps most importantly, *how* should we be *communicating* with each in order to express our thoughts and feelings about the world—what would a “discourse of environmental sensitivity” look like? These are the kinds of questions I find myself asking these days—they are the questions of a literary scholar who feels himself to be living in a threatened world.

I come from a culture that appears to believe in numbers, that trusts quantitative information as a relatively firm version of “the truth,” while anything non-quantifiable tends to come under suspicion. In the United States, people want to know “the bottom line.” What does it all add up to, what does it cost? We are ready to pull out our wallets and pay for whatever we want at a given moment, and yet we are likely to fight to avoid changing our lives if that's what's called for to achieve our purposes. We have difficulty realizing that changing our lives may

be the cost of certain things we profess to want.

We believe in numbers in my culture, but we do not really understand numbers any better than people elsewhere in the world. Perhaps it's the very alienness of numerical information that seems authoritative and impressive—trustworthy. We've tended to put our lives and the well-being of the planet in the hands of people who can speak a quantitative language: the food distributors who make sure the shelves in our supermarkets are well stocked; the engineers who design our automobiles and the roads we drive on; the physicians who deliver our babies and care for us when we are not feeling well; the technicians who hook up our telephone and cable TV service. Sometimes we notice things aren't going quite right: smog hangs in the valley where we live and even brisk winter winds can't clear the air; a power outage at the office knocks us off e-mail for a weekend and underscores our excessive attachment to this technology; a glance out the window at home shows the steady creep of urban development up the side of a nearby mountain, making population growth a visible phenomenon. Vaguely troubled by these experiences, we try to ponder their implications, what sort of corrections might be needed, and then, overwhelmed, we suspend our worries and rationalize that "The experts have everything under control." We re-immense ourselves in the daily activities that we can manage.

"Truth" inheres in numbers, and people who speak (and write) the language of numbers *appear* to know what's going on in the world. In the past decade or so, American writers have offered several powerful investigations of this numerical fetish of ours. One of the particularly potent meditations on the phenomenon of quantification is Annie Dillard's 1999 book *For the Time Being*. In recent months, I've found myself thinking a lot about a brief passage from that book. "There are 1,198,500,000 people alive now in China," writes Dillard. "To get a feel for what this means, simply take yourself—in all your singularity, importance, complexity, and love—and multiply by 1,198,500,000. See? Nothing to it" (47). Who in this room can perform such a simple act of multiplication? "Nothing to it," jokes Dillard. Simply do the math. It would be difficult to state more graphically that we struggle to under-

stand big numbers, whether these numbers describe quantities of *things* or the kinds of vast processes—either sudden cataclysms or slow, barely perceptible systemic changes—that we are told are occurring in the natural world.

I shift my attention from Annic Dillard's teasing, philosophical treatment of the meaning of numbers to examples of our efforts to process the latest environmental news. A good illustration of what happens when we try to respond to quantitative information about the environment comes in Terry Tempest Williams's statement in the "Setting It Right" symposium in the pages of the January/February 2000 issue of *Sierra* magazine. I am singling out a passage that emphasizes what I take to be a common response to information presented in an abstract or numerical form. "Then I hear all of the statistics," writes Williams,

the losses we are incurring, the truth and weight of issues like genetically manipulated foods, a population of 6 billion and rising, the loss of diversity of species and land, the control wielded by global corporations, I become mute, my spirit crushed by information that becomes abstracted into despair. My human frame cannot accommodate it all. I become listless, apathetic, impotent, and turn inward, turn to pleasure, to distraction, to anything that will move me away from what I perceive to be the true state of the world. (45)

Although Williams suggests that by focusing on her own, local experience, on the good, constructive work that her neighbors in small-town, southern Utah are doing, or that people in other specific communities are doing, to restore and protect their immediate environments, I am afraid that this sense of solace is like whistling in the dark. It can make us feel better for the moment, but it seems simply to avoid the bigger issues, to defer or deflect them. I am reminded of Robert Jay Lifton's notion of "psychic numbing," an idea elaborated in his distinguished 1967 book *Death in Life: Survivors of Hiroshima* and in many essays since then. In a 1995 article called "The Age of Numbing," Lifton and co-author Greg Mitchell define "Psychic numbing" as "a diminished

capacity or inclination to feel." They explain that

Hiroshima survivors remember witnessing at the time of the bomb terrible scenes of suffering—nothing less than a sea of death around them—but found very quickly that they simply ceased to feel. They spoke of "A paralysis of the mind," of becoming "insensitive to human death," of being "Temporarily without feeling." This useful defense mechanism prevents the mind from being overwhelmed and perhaps destroyed by the dreadful and unmanageable images confronting it. ("The Age of Numbing" 58)

Apathetic responses to the daunting unprocessability of environmental statistics are, I believe, comparable to the self-protective numbness that human beings come to feel when faced with an extraordinary physical crisis, such the experience of a nuclear explosion. "Psychic numbing," as originally articulated in *Death in Life*, is a survival mechanism, a way of dealing with trauma. But, as Lifton and Mitchell speculate,

Over time, the boundaries of numbing can blur. By closing ourselves off from the human costs of our devastating weapon, we are more able to do the same when confronted with other instances of collective suffering—the 1994 genocides in Bosnia and Rwanda, for example. We can become increasingly insensitive to the physical violence around us, as well as to the institutionalized violence of poverty and homelessness. The tendency toward numbing can even extend to everyday forms of human interaction. (59)

Although Lifton and Mitchell argue it is our habit of ignoring the phenomenon of the atomic bomb that spurs the "tendency toward numbing," I would suggest, too, that we are inundated with information about devastating losses, from earthquake victims in Turkey to the extinction of species in North America, and numbing seems to be the automatic

and widespread psychological response. Faced with the ubiquity of suffering, presented to us by way of nerveless numerical discourse and the glaring graphicness of contemporary journalistic photography, what hope do we have of surmounting the deadening effects of numbness and our corresponding failure to act in positive, constructive ways?

Last fall, I read Sven Birkerts's essay "American Nostalgias," which builds implicitly upon Bill McKibben's book *The Age of Missing Information* and observes some of the fundamental shifts of consciousness that have occurred during the past century and continue to intensify. "We have . . . shifted from a simple, direct, unmediated sense of reality," Birkerts writes,

to one that is complexly mediated, saturated with information and with the possibility of information. We once knew the world with our senses, or at one remove, and now we know it increasingly as a field of data. . . . The original world was determined in many essential ways by the brute realities of nature—by weather, by terrain, by the time required for various processes, and the intervals of long-distance communication. The new reality is significantly cut off from nature, largely unaffected by weather, global in reference, and premised on instantaneous communication. For the real we are substituting the virtual. (27-28)

What does it take to impress human beings with a sense of vivid reality, to bring us beyond where we've been, to new worldviews and new sensitivities? We are a plodding, intransigent species, truth be told. As Henry David Thoreau once put it, "We need to be provoked,--goaded like oxen, as we are, into a trot" (*Walden* 102-03).

Neurologist Robert Ornstein and population biologist Paul Ehrlich use more academic phrasing in their 1989 book *New World New Mind*, explaining:

We don't perceive the world as it is, because our nervous system evolved to select only a small extract of reality and to

ignore the rest. We never experience *exactly* the same situation twice, so it would be uneconomical to take in every occurrence. Instead of conveying everything about the world, our nervous system is “impressed” only by *dramatic changes*. This internal spotlight makes us sensitive to the beginnings and endings of almost every event more than the changes, whether gigantic or tiny, in the middle. (3)

The irony of the human tendency to generalize, to make caricatures of experience, is that we yearn for specificity and uniqueness. Our nostalgia for physicality within the contemporary sea of abstract information, to use Sven Berkerts’s notion, belies the even deeper biological tendency to ignore the specific and look for a broader pattern. Broad patterns of experience can be most efficiently described with numbers. This concept is readily understood by social and physical scientists, and almost universally deplored by all others. Yet even for scientists, human as they are, it is difficult to overcome the impressiveness of the representative case. As Ornstein and Ehrlich state, “One or two dramatic events can have a striking influence; statistics can be easily ignored. It is the phenomenon that psychologists Daniel Kahneman and Amos Tversky call representativeness” (113). This psychological tendency seems to result from our ancestors’ need to respond to immediate, nearby threats, to live in the here-and-now or perish.

Ornstein and Ehrlich proceed to offer a pragmatic explanation of how the human brain evolved, and a chilling pronouncement about the consequences of our failure to evolve beyond this level of adaptation. True, in the distant past, the individual who reacted powerfully to sudden danger was more likely to survive than someone who “Pondered the evidence more calmly” (113). If the threat—perhaps the potential danger of a large predator—proved to be false, the consequences of responding would still be minor compared with those of not responding. The world today is presenting to us a host of worries that, in many instances, fail to trigger any alarms at all:

Threats in our world have changed, but not our responses to them. Individuals and society as a whole are especially susceptible to anyone who can exploit the parochial focus of the old mind. In the modern world that focus leads to the vulnerability to terrorism, to brutality spreading as a result of watching violence in movies and on television, and to the election of incompetent politicians who look good and sound good and thus make us feel good. But its focus also leads to the slighting of the hazards of acid rain, CO₂ buildup, desertification, and other unprecedented perils approaching too gradually to trigger our “fight-or-flight” responses. (114)

The consequences of this evolutionary tendency are not minor. Journalist Edith Efron would disparage such a claim as apocalypticism, as a hyperbolically dire warning. But if the warning proves to be false, what are the potential consequences of our heeding it? And if it proves to be accurate, more or less, what would be the implications of *not* heeding it?

Ornstein and Ehrlich, like many scholars and artists, prefer the option of sensitivity. They seek, in their writing, to reach toward a new level of sensitivity beyond the immediate, hands-on version of our biological ancestors. “The probability of global disaster goes up each year,” they warn,

but our consciousness of it does not. We seem to need shocks and tragedies to goad us into action. The old mind quickly tires of being cautioned, especially about dangers that cannot be averted by immediate, *personal* action.

But if blindness to threatening gradual change continues, eventually a weather report might sound like this: “Clear skies on Thursday, followed by scattered nuclear explosions in the Northwest—with possible unseasonable freezes for the few months.” (118)

This passage, though published only a decade ago, obviously emerges from the fears of the Cold War. Today's political reality may be different from the context that inspired *New World New Mind*, and yet many of the concerns that preoccupied Ornstein and Ehrlich persist. Some have now intensified.

Given that we are a species inclined to care about individual cases and to be daunted by (or disinterested in) vast processes and numerical descriptions, how might we ever learn to think in a way that will enable us to adapt to the dangers of the modern (and future) planet. Robert Ornstein and Paul Ehrlich point to such problems as acid rain, CO₂ buildup, and desertification. Add loss of biodiversity, vast increase of human population and resource consumption, gradual (but ultimately dramatic) shifts in temperature, and various other almost imperceptibly vast changes in the human and environmental realms, and we are facing potential systemic transformation that will likely change the Earth into a different planet than the one we currently live on. And yet it would be difficult to convince most people in the United States that there's anything going on that might require them to alter today's habits, their use of resources and production of waste. What kind of language might break through this apparent insensitivity and trigger new alertness to the potential hazards our civilization faces?

As I explained in a March 1999 article that appeared in *Environment* magazine, there has been in recent decades an extraordinary surge of important North American writing about the relationship between human beings and the natural world. Contemporary environmental writers in the United States are not an isolated group, nor is their influence limited to the American literary community. Texts commonly thought of as classics in the field are being coupled with new and unique perspectives from around the globe. The literary dimension of this current gathering in Taiwan, of course, is a testament to the international significance of contemporary environmental literature. From the work of Homero Aridjis in Mexico to the writings of Michiko Ishimure in Japan, Judith Wright in Australia, Kole Ade-Odutola in Nigeria, Oliver Friggieri in Malta, and many other writers throughout the world, environmental literature and the scholarly response to this literature

(sometimes called “ecocriticism”) represent some of the most compelling developments on the international literary scene—and this work has ramifications that go far beyond the realm of aesthetics. I would argue that this body of literature, known variously as “nature writing” or “environmental writing,” has the potential to help readers re-imagine their relationship with the planet and overcome crippling fears and feelings of alienation—and through a kind of ripple effect this literature will reach beyond the people who actually read it. I believe this is what Terry Tempest Williams is getting at when she concludes her comments in *Sierra* magazine last January by urging her audience not only “To become biologically literate,” but “To make the abstract real, to be unafraid to speak of what we love in the language of story, to remember we are engaged in bloodwork, one day at a time” (45).

Scott Russell Sanders, another distinguished writer in the tradition of American nature writing, notes in his 1987 essay “Speaking a Word for Nature,” that

The gospel of ecology has become an *intellectual* commonplace. But it is not yet an *emotional* one. For most of us, most of the time, nature appears framed in a window or a video screen or inside the borders of a photograph. We do not feel the organic web passing through our guts, as it truly does. While our theories of nature have become wiser, our experience of nature has become shallower [. . .]. Thus, any writer who sees the world in ecological perspective faces a hard problem: how, despite the perfection of our technological boxes, to make us feel the ache and tug of that organic web passing through us, how to situate the lives of characters—and therefore of readers—in nature. (226)

This passage points to what I take to be one of the essential goals of environmental literature: to impress readers with a vivid, visceral sense of their own naturalness and, by extension, to encourage readers to pay attention to the nonhuman world on aesthetic, ecological, and political levels.

Literature and the other arts are ideal media for exploring and communicating systems of values—ethical frameworks—within specific communities and between one culture and another. This is not a particularly novel idea, but it opposes postmodern critical theory which is frequently noted for its indeterminacy, its devotion to textual debates, and its indifference to real social problems. The critic James S. Hans sums up the ethical component of literature by stating, “literature does not exist in its own discrete space, so to limit our discussion of it to its ‘literariness’ is to denude it of its critical links to the other systems that combine to articulate our sense of values.” The contemporary Montana writer, William Kittredge, takes this notion even further, arguing that “laws control our lives, and they are designed to preserve a model of society based on values learned from mythology. Only after re-imagining our myths can we coherently remodel our laws, and hope to keep our society in a realistic relationship to what is actual” (64). In other words, Kittredge asserts that laws, and by extension our governments’ environmental policies, do not *initiate* environmental values, but instead *emerge* from the values that exist in society already, having been molded by experience and by our exposure to stories and images through the arts and other information media.

Literature performs a social function and can be a vehicle for social reform. The distinguished nature writer Barry Lopez commented explicitly about the social and ethical dimension of the arts in a 1990 catalog essay he wrote for an exhibit by the Maine artist Alan Magee. Confessing that his own expertise was in the literary arts rather than the visual, Lopez nonetheless raised a series of issues that are fundamental to linking art and environmental awareness:

What is the meaning of this work [. . .] to a community of people? Is it rich in allusion and metaphorically striking, more in other words than just an announcement of the artist’s presence in the world? Does it disturb complacency or stimulate wonder? Does it awaken anger or compassion?

These questions, I think, are more social than aesthetic. According to

Lopez,

They proceed [. . .] from a feeling that if art is merely decorative or entertaining, if it does not elicit hope or a sense of the sacred, if it does not speak to our fear and confusion, or to the capacities for memory and passion that imbue us with our humanity, then the artist has only sent us a letter that requires no answer. (1)

This concept of the social responsibility of art represents a basic paradigm shift for most viewers, listeners, and readers. It is a shift that broadens our attention from mere “Aesthetic brillian[ce]” to the moral dimension of the work or works in question. I believe this is what Homero Aridjis is thinking about when he argues, in the millennial issue of *Sierra* that in order to avert virtually apocalyptic environmental degradation we need the sort of “passive shift of consciousness” that can only result from a new “spiritual movement,” from “channel[ing] humankind’s religious potential toward the defense of nature” (46). One of the reasons environmental literature has become and continues to emerge as such a powerful force in contemporary literary expression is that writers such as Sanders, Kittredge, and Lopez—as well as Dillard, Williams, McKibben, Aridjis, Rick Bass, Robert Michael Pyle, Wendell Berry, Gary Snyder, Robert Hass, Rudolfo Anaya, Linda Hogan, Peter Matthiessen, and dozens of other environmental writers—understand their work as the effort to achieve not only beautiful, lyrical language, but an understanding of human society’s relationship to the actualities of the planet.

Ecologist Garrett Hardin once expressed suspicion about literary language as a means of articulating environmental ideas. In his 1985 volume *Filters Against Folly: How to Survive Despite Economists, Ecologists, and the Merely Eloquent*, he stated:

Poetry is least dangerous when the typographical arrangement of words reveals the author’s poetic intent. It is most dangerous when the argument is cast in the form of

prose, in sentences heavily infected with unacknowledged poetic claims of non-negotiability. In our time the claims of recognized poets are no longer a serious threat to rational thought. The gravest threats to rationality now come from those who employ the rhetorical weapons of poetry from behind an ambush of prose. Popularizers of ecology and advocates of the environment are not the least of the offenders.
(33)

I would argue, though, that this is an unnecessary fear. Hardin seems to worry that contemporary nature writers, working in the subtle guise of poetic prose, will undermine rational thinking about the environment. However, much of what we think and feel about our relationship to nature *should* not, and perhaps *cannot*, be expressed in wholly rational terms. Of course, it's important for any environmental writing to be rooted in the most current and most accurate scientific information; it's crucial, for writers and scientists to be talking with each other, and that's what I take to be the fundamental purpose of gatherings I see happening all over the world now, such as last January's The Earth 2000 Symposium, which took place in Mexico City under the auspices of UNESCO and the International PEN Club. The best way to develop combinations of affectively meaningful discourse and empirically-based ideas is to foster ongoing, cross-disciplinary communication so that economists, ecologists, and artists can work together to avoid the oversimplifications and extremes toward which our disciplines, in isolation from each other, might be inclined.

Writers, for instance, to achieve the understanding of the actual condition of the planet and projections for the future must have a sturdy appreciation for, and a firm grasp on, the scientific world. The lessons of modern environmental science—including the work of ecologists, environmental historians, and environmental anthropologists—are often extremely abstract and difficult for the public to believe, difficult even to decipher. What is an ecosystem and why is it so delicate? Does the ozone layer that protects the Earth from the sun's ultraviolet rays really have a hole in it? How do we know that hundreds and hundreds

of animal and plant species are disappearing each year, becoming extinct? Why does this matter, especially if extinction itself is a natural process? There are now many eloquent works of environmental literature that explore these and other related topics in a way that is designed to compel the general public to think independently about the state of the world, to provoke concern and wonder and a desire to learn more. I am thinking, for instance, of two recent examples: Nebraska biologist John Janovy, Jr.'s 1997 work, *10 Minute Ecologist: 20 Answered Questions for Busy People Facing Environmental Issues*, and Bill McKibben's *Maybe One: A Personal and Environmental Argument for Single-Child Families*, which came out in 1998. These two books are examples of writing that takes numerical information and presents it by way of images and stories, that attempts to explain the context in which the information was derived. Works like these, together with more metaphorical and indirect writings such as the poetry of A.R. Ammons and the stories of Ursula K. Le Guin, have the potential to help readers gain a new sensitivity to their place in the world—a sensitivity that goes beyond the mere accumulation of information.

John Janovy holds an endowed chair in the biology department at the University of Nebraska, where his teaching and scientific research focus on the field of parasitology. He is the author of many scientific papers and maintains funding for a research lab at the university. In the mid-1970s, shortly after attaining tenure in the biology department, Janovy became frustrated with the politics of academia and began to divert some of his attention and energy to literary expression and projects that would explain scientific ideas to general readers. In 1978, he published *Keith County Journal*, a collection of personal essays on subjects related to his field research. Two years later the novel *Yellowlegs: A Migration of the Mind* appeared, telling the story of an individual migrating bird. Since then, Janovy has published such books as *Back in Keith County* (1981), *On Becoming a Biologist* (1985), *Fields of Friendly Strife* (1987), *Vermilion Sea: A Naturalist's Journey in Baja California* (1992), and *Dunwoody Pond: Reflections on the High Plains and the Cultivation of Naturalists* (1994). But the particular book that interests me in the context of this discussion of alternative modes of

ecological discourse, and especially those approaches that seek to express complicated environmental phenomena in non-quantitative language is *10 Minute Ecologist*, which appeared in 1997.

Janovy explains the genesis of this book in his preface:

I was sitting in a meeting one day listening to one of the world's most distinguished scientists talk about biodiversity. His audience was made up mainly of business executives and attorneys who, because of various factors such as government regulation or marketplace events, suddenly found themselves dealing with environmental issues. As I looked around the room, I could see the audience paying close attention to the speaker. But afterward someone said to me: "We loved that speech but I still don't know what biodiversity really means or why it's so important." At that point I decided all these businessmen needed help. But they didn't have the time to go back to college and major in biology. That's when I decided to write this book. (xi)

Keeping this audience in mind, the biologist has attempted to present a series of complex ecological topics in a manner that should be accessible to an educated but non-scientific group of readers. In the United States, children often play a game called "Twenty Questions," where several players are invited to ask twenty questions in order to figure out what another person has in mind (a person, place, or object). Janovy offers his readers twenty questions pertaining to "ecology" and twenty brief responses, mini-essays that he thinks readers should be able to get through in about ten minutes each—this idea of brevity is important, as many people who need to know things about the environment simply don't have much time in their daily lives to read long, complex articles on these subjects. Despite the difficulty of responding to such questions as "That is biodiversity?" and "That is an ecosystem?" and "Why study islands?" in five or six pages for each topic, Janovy throws himself into the project and attempts to find an accessible and scientifically legitimate mode of communication. "We've tried

very hard to make reasonably complex ideas accessible to the same audience that reads paperbacks and watches television,” (xii) he states.

Because one of my other important textual examples in this paper will be Bill McKibben’s *Maybe One*, a project that attempts to make population and human reproduction meaningful to a general audience on both intellectual and emotional levels, I’d like to comment on John Janovy’s population chapter from *10 Minute Ecologist* as well. The first thing one notices about this chapter is the indirect title: “How many is too many?” The avoidance of politically and emotionally charged terms such as “population” and “reproduction” is quite important; the author does not want to scare away readers at the outset. But he does quickly get to the issue of overpopulation in the first sentence. Janovy opens his five-page essay by offering a brief, simplified history lesson, showing readers that the concept of “Too many” dates back at least a few centuries (in other words, this is not merely a modern social and environmental problem). “In most people’s minds,” begins Janovy, “The name ‘Malthus’ connects with the concept of overpopulation, and the adjective ‘Malthusian’ refers to the dire consequences of reproducing to the point that we run out of resources, as predicted by the British economist Thomas Malthus in 1798.”

In his *Essay on the Principle of Population*, Malthus noted that populations tended to grow exponentially, so that the population increase, as measured in numbers of individuals, was greater with every new generation, whereas food supplies increased by only a constant amount over time. Eventually, Malthus reasoned, populations would outgrow their food supply, and would then become limited by disease, famine, and war (76).

Notice how this opening paragraph delicately avoids emphasizing *human* populations and instead speaks about “populations” and “Individuals” without denoting species. The next several paragraphs explicitly avoid focusing on the issue of human overpopulation, instead discussing the population biology of plants and animals and observing that most studies in this field indicate “some needed resource is usually shown to be a limiting factor on the population” (76-77).

On the third page of the essay, Janovy gestures toward the human

relevance of the topic, but in a relatively safe and non-argumentative way, stating, 'Too many' is clearly a human idea, and it refers to the numbers that can be supported by a particular set of resources. Nature really doesn't care whether organisms live or die; only humans care. But we can explain 'too many' in a rather neutral and practical way by considering what ecologists call carrying capacity" (78). This emphasis on apparent neutrality and practicality is one of the keys to Janovy's discourse of accessible ecological information. He is trying not to be boring or offensive to his readers, so he attempts to make his prose clear and to find cleverly oblique ways of approaching sensitive issues. The term "carrying capacity" has everything to do with human population, but Janovy initiates his "neutral and practical" discussion by talking about plant seeds in boreal forests, and then he moves into a two-paragraph story, a kind of parable, about talking bacteria in a test tube. The bacteria reproduce themselves actively, and by the end of the day, "The bacteria," writes Janovy, "have flourished, multiplied, and diversified into a large community that includes bacterial politicians, businessmen, ecologists, and of course college students" (79). The bacteria then begin to debate what to do about resources and population. "Remember, it's only a story," Janovy reminds his readers, suggesting that there's no need for humans to take umbrage at the debate. He writes:

And what do these talking bacteria say at 11:58 p.m.? The ecologist, of course, says what ecologists have been saying for quite a while—namely, that *we are about to run out of resources*. The politician, likewise, says what politicians have been saying for quite a while, namely that *the ecologists are idiots; we have three times as many resources as we've used throughout all our history, so don't worry (and vote for me because I am so smart)*. In a similar manner, the bacterial businessman says what businessmen have been saying forever and forever, namely that *our political leaders are right; we have three times as many resources as we've used throughout all recorded history, so we should sell some*

to another test tube (and gimme a tax break to create the new jobs produced by these sales). And the bacterial college student is asking what young people ask all the time, namely: Whom should I believe? I think we should listen to the ecologist, but I am biased. (79)

Even while expressing his own personal perspective on this debate, Janovy tries to avoid stigmatizing himself as a liberal, environmentalist intellectual. Rather than belaboring his endorsement of the ecologist's perspective, he jokes about his "bias." Still, he concludes this section of his essay by offering a fundamental, apparently incontrovertible principle. "The point of the story is fairly obvious," he writes: "No matter what you want to believe about the natural world, we are still very much a part of that world, and there are certain fundamental ecological principles that operate on all organisms no matter what they believe. One of these principles is that environments possess carrying capacities and will not support populations larger than those capacities, no matter what politicians and businessmen claim" (80).

The rhythm of the entire essay stresses the idea of things building up to an inevitable conclusion by way of a subtle and gradual approach. It's obvious from the outset that Janovy will eventually be talking about human reproduction and overpopulation, but he takes his time getting there. It's obvious in the parable about the bacteria in the test tube that the creatures will eventually have to figure out how to manage their own numbers and their increasingly limited resources. At last, in the eleventh of the essay's twelve paragraphs, Janovy turns to the inevitable crux of the matter:

To what extent does this principle apply to humans? That is a good question with many answers. Mathematicians, as well as many college students, can easily calculate the year at which the mass of humanity comes to exceed the mass of Earth, assuming that human reproductive rates remain what they are today. It doesn't take a rocket scientist, or even a ten-minute ecologist, to figure out that some time prior to

that date, humanity will begin to live a rather Malthusian existence, in which our resources become increasingly scarce. On the other hand, something may happen to stop human population growth well before it reaches the Earth's carrying capacity. (80)

And the author then offers a few suggestions about what we might do to avert the Malthusian outcome of unchecked human population growth. Although certain kinds of readers, especially religious fundamentalists, are unlikely to soften their views on contraception and reproductive responsibility as a result of Janovy's delicate rhetorical dance, it seems unlikely that such readers would even open a book like *10 Minute Ecologist* in the first place. However, many people in the United States, including businessmen and lawyers and politicians (people with substantial social influence), want to know more about the relation between human activity and the environment—they realize they don't know it all and feel some urgency for the improvement of their ecological knowledge. By not attacking these kinds of readers and flouting their religious and political beliefs, by adopting at least the guise of authorial neutrality and by moving very gradually toward the vexed human relevance of population biology, Janovy manages impressively to open up new perspectives on population issues to an important audience. The other nineteen essays in *10 Minute Ecologist* likewise explore appropriate modes of discourse in which to make complex and sensitive ecological topics understandable and interesting to non-scientists.

Like Janovy, Bill McKibben has made a name for himself by addressing challenging scientific topics and controversial political issues in clear, engaging language. He would most likely describe himself as a journalist, not as a literary artist. But I believe there's an exceptional level of craft and sophistication in his writing. McKibben earned his B.A. in government from Harvard in 1982 and after graduation went to work as a staff writer for the *New Yorker*, one of the most widely read American magazines. He wrote hundreds of columns and feature articles for the *New Yorker* before becoming a free-lance writer in 1987

and moving to a house in the rural Adirondack Mountains of upstate New York. In 1989, he published his first book, *The End of Nature*, a study of ozone depletion and environmental disturbance that has become pervasive as a result of human activity. In 1992, *The Age of Missing Information* appeared, examining the complicity of television in the contemporary environmental crisis and the implications of television for the ineffective communication of environmental information. His 1995 book, *Hope, Human and Wild*, describes examples from Brazil, India, and the United States of environmental situations that offer some hope for environmental recovery. The book I'd like to comment on in a bit more depth is McKibben's 1998 meditation on population and reproduction, *Maybe One: A Personal and Environmental Argument for Single-Child Families*.

If the key to John Janovy's treatment of population is indirectness and gradualness, McKibben's approach seems to be a process of telescoping, of moving inward toward intimate, personal aspects of human reproduction and then moving out to the broader, more abstract aspects. This movement back and forth from the intimate to the global is an attempt to make the topic accessible and meaningful by way of narrative prose without compromising the scientific information that the author feels his readers need to have in mind in order to make informed decisions about reproduction in their own lives. From the very beginning of the book he acknowledges the sensitivity of the subject matter and apologizes for intruding on his readers' private lives:

Population is a subject I've been trying to avoid for years, and not just because I know it will cause turmoil and angry controversy. It scared me more because it forced me and my wife to confront head-on the issue of how many children we were going to have, a decision which probably affects each of our lives more than any we will ever make. It's as intimate a topic as there is, one of the last subjects we avoid in this taboo-free society. At some level, it's not any of my business how many kids anyone else has.

And yet my work on environmental issues kept bringing

questions of population front and center. (9)

McKibben goes on in his introduction to explain why he finds it necessary to confront the issue of population in the book. *Maybe One* differs from more conventional examples of population literature not only because of the author's use of personal narratives of reproductive decision-making, but because of his interest in the emotional and developmental experience of growing up as a single child. As he explains, "We did it because of Sophie, my four-year-old daughter. I wanted to make sure that growing up without brothers and sisters would not damage her spirit or her mind." Likewise, the book's final chapter examines what it means to be parents raising "such smaller families than tradition dictates, or to raise no families at all." By focusing on children and parents, and not just on their material existence but on their "souls" (their emotional well being), McKibben hopes "To make what has usually been an abstract question very personal and immediate" (11).

The opening chapter of *Maybe One* begins with a paragraph about the author's fears that his approach to parenting will "screw up" his daughter Sophia, and the final chapter concludes with a description of a delightful (and implicitly *routine*) afternoon and evening with his daughter as they play and learn together. In between these "book ends," these frames, McKibben offers clusters of chapters devoted to "Family," "Species," "Nation," and "Self," presenting research on topics ranging from child psychology, population biology, resource economics, pollution, and contraception, mixed with personal stories and narratives of his research practices, including stories of working in the basement of the library at the State University of New York in Albany and meeting scholars such as psychologist Toni Falbo for an interview in Washington, D.C.

Perhaps the best way, in brief, to explain the ecological discourse of *Maybe One* is to refer to the opening of Chapter Eight, which begins the section of the book devoted to "self." The chapter starts with a narrative of McKibben's own experience having a vasectomy performed at the Ottawa Vasectomy Clinic. We learn about the doctor: "Then Dr. McGuire came in, wearing khakis, old Nikes, an earring, a plaid shirt.

So far that day, he said, I've done nine vasectomies, pruned the branches of nine family trees. He was calm, gentle—sweet" (182). And then comes the procedure: "So I sat on the table, and pulled my pants down around my ankles, and he swabbed my scrotum with iodine . . . , and then he injected a slug of anesthetic into each side of my testicles" The whole story takes only three pages, but it makes the entire subject of vasectomies profoundly personal and accessible. This is clearly an author who has lived the subject he is discussing. After telling the story of the medical procedure, McKibben backtracks and explores the emotional, philosophical, and even religious dimensions of reproduction, asking why it is that humans seem biologically programmed to reproduce ourselves and how we might come to act in a way that goes against this programming. The discussion is reasonable and respectful, even sympathetic. McKibben seems to appreciate both the dogmatic and personal reasons for having children, pointing out that in his own "circle of friends and acquaintances, the single most common route to maturity has been through raising children, often lots of children." But he then walks the reader through his own decision-making process, his choice not to have additional children, as a result of exploring the fact that "now we live in an era . . . when parenting a bunch of kids clashes with the good of the planet" (196).

One could argue that there will be a limited audience for any work of literature, and perhaps an even narrower audience for literature (or literary journalism) that explicitly addresses issues of ideology, politics, and biology. However, the process of dispersing ecologically enlightened ideas to the general public requires the development of new modes of discourse—new ways of telling describing experience, new strategies for translating statistics into stories. Writers such as Janovy and McKibben may be writing, to some extent, for the "choir" of already-converted readers, but their words are giving these readers more refined ways of thinking about such complex topics as population and reproduction, and these readers in turn are learning new ways of expressing their own thoughts and experiences to friends and colleagues and sometimes to their own readers. Sometimes, as in the case of McKibben, the essays that eventually appear in books are first broadcast to general

audiences in the pages of mass-market magazines, such as *The New Yorker* or *The Atlantic*. Without sacrificing their sense of humor or their compassion for human beings (as individuals and as a species), Janovy, McKibben, and other environmental writers are inventing a discourse of ecological sensitivity that is helping to communicate important scientific and ethical information to an ever-increasing readership.

Literary critic Glen A. Love, one of the founders of the scholarly field known as "ecocriticism," claimed in 1990 that "the most important function of literature today is to redirect human consciousness to a full consideration of its place in a threatened natural world" (213). He did not limit his statement to *American* literature, but implied that writers in every country—as well as artists working in other media—must assume responsibility for guiding their audiences to a deeper, more sustainable relationship with nonhuman nature. It is easy for people in many parts of the world, and perhaps especially for residents in such countries as the United States and Japan, simply to live from day to day, satisfying their immediate needs and trusting that there will always be a tomorrow for our species. The challenging task for nature or environmental writers is both to create an interest in nature among their readers and to impress these readers with the value of living with a long-term vision of our relationship to the rest of the planet. To succeed in this effort, we must continue to refine the discourse of environmental sensitivity.

WORKS CITED

- Aridjis, Homero. See Pope.
- Birkerts, Sven. "American Nostalgias." In *The Writer's Chronicle: A Publication of the Associated Writing Programs* (February 1999): 27-34, 36-37.
- Dillard, Annie. *For the Time Being*. New York: Knopf, 1999.
- Efron, Edith. *The Apocalypitics: How Environmental Politics Controls What We Know About Cancer*. New York: Simon & Schuster, 1984.

- Hans, James S. *The Value(s) of Literature*. Albany, NY: State U of New York P, 1990.
- Janovy, John, Jr. *Ten Minute Ecologist: 20 Answered Questions for Busy People Facing Environmental Issues*. New York: St. Martin's, 1997.
- Kittredge, William. *Owning It All*. Saint Paul, MN: Graywolf, 1987.
- Lifton, Robert Jay. *Death in Life: Survivors of Hiroshima*. New York: Random House, 1967.
- _____, and Greg Mitchell. "The Age of Numbing." *Technology Review* (August/September 1995): 58-59.
- Lopez, Barry. *Alan Magee: Inlets*. Portland, ME: Joan Whitney Payson Gallery of Art, 1990.
- Love, Glen A. "Evaluating Nature: Toward an Ecological Literary Criticism." *Western American Literature* (1991): 201-13.
- McKibben, Bill. *Maybe One: A Personal and Environmental Argument for Single-Child Families*. New York: Simon & Schuster, 1998.
- _____. *The Age of Missing Information*. New York: Random House, 1992.
- Ornstein, Robert, and Paul Ehrlich. *New World New Mind: Moving Toward Conscious Evolution*. New York: Doubleday, 1989.
- Pope, Carl. "Getting It Right." *Sierra* (2000): 40-47, 117.
- Slovic, Scott. "Giving Expression to Nature: Voices of Environmental Literature." *Environment* (1999): 6-11, 25-32.
- Thoreau, Henry David. *Walden*. 1854. Princeton: Princeton UP, 1971.